Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

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General Certificate of Education
January 2003
Advanced Subsidiary Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

COMPUTING CPT1

Unit 1 Computer Systems, Programming and Networking Concepts

Tuesday 14 January 2003 Afternoon Session

No additional materials are required.
You may use a calculator.

Time allowed: 1 hour 30 minutes

Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided. All working must be shown.
- Do all rough work in this book. Cross through any work you do not want marked.

Information

- The maximum mark for this paper is 65.
- Mark allocations are shown in brackets.
- You will be assessed on your ability to use an appropriate form and style of writing, to organise relevant information clearly and coherently, and to use specialist vocabulary, where appropriate.
- The degree of legibility of your handwriting and the level of accuracy of your spelling, punctuation and grammar will also be taken into account.

For Examiner's Use			
Number	Mark	Number	Mark
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

LEAVE MARGIN BLANK

Answer **all** questions in the spaces provided.

1 (a) What is meant by

(i) Hardware; .....

.....

(1 mark)

(ii) Software? .....

.....

(1 mark)

(b) Is an operating system hardware or software? .....

(1 mark)

(c) Is a data bus hardware or software? .....

(1 mark)

4

2 Bit patterns can be interpreted in a number of different ways.

(a) A computer word contains the bit pattern 0001 0111.

What is its decimal value if it represents

(i) a pure binary integer; .....

(1 mark)

(ii) a BCD (Binary Coded Decimal)? .....

(1 mark)

(b) A computer system uses **odd** parity. The most significant bit (MSB) is used as a parity bit. The ASCII value for the character '!' is decimal number 33.

(i) What would be the 8-bit binary pattern to represent the character '!'?

MSB

(2 marks)

(ii) Asynchronous data transmission is used if one character is sent at a time. One start bit marks the beginning of a character and one stop bit marks the end of a character.

What would be the bit pattern if the character '!' above is sent using asynchronous data transmission?

(1 mark)

5

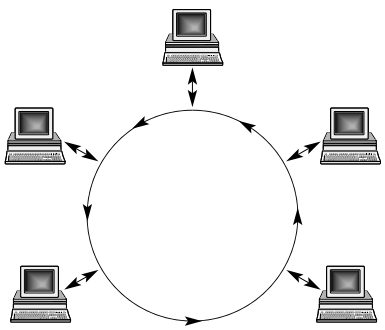
3 Acme Design, a small graphic design firm, has several stand-alone computers which staff use for their design work. They would like to use a LAN (Local Area Network) to share printers, scanners and plotters.

(a) What extra hardware is needed for each stand-alone computer to be connected to a LAN via cables?

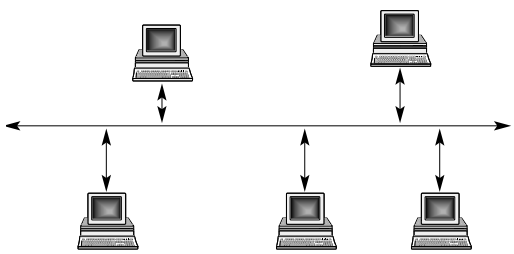
.....

(1 mark)

(b) Computers could be connected in one of the topologies shown below.



Topology A



Topology B

(i) Name these network topologies.

A ..... B .....

(2 marks)

(ii) Give **one** advantage of topology A over topology B.

.....

.....

(1 mark)

(iii) Give **one** advantage of topology B over topology A.

.....

.....

(1 mark)

(c) (i) What is a protocol?

.....

.....

(1 mark)

(ii) Why is a protocol needed?

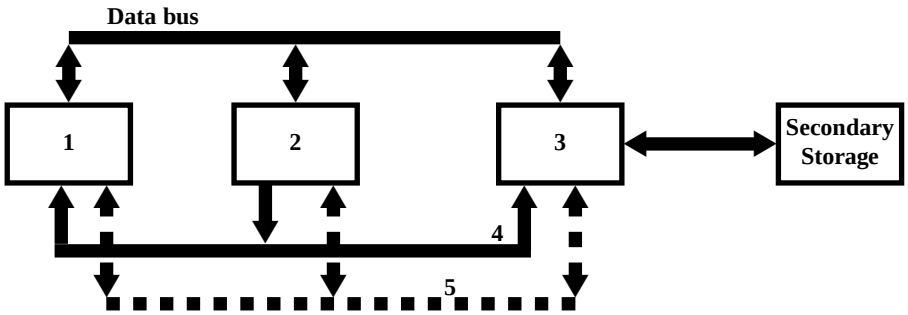
.....

.....

.....

(1 mark)

4 Some of the components of a computer system are processor, main memory, address bus, data bus, control bus, I/O port and secondary storage.



The diagram above shows how these components are connected.

(a) Name each of the following:

1 .....

2 .....

3 .....

4 .....

5 .....

(5 marks)

(b) (i) What is the function of the following components:

processor; .....

.....

main memory; .....

.....

secondary storage? .....

.....

(3 marks)

(ii) Give **two** examples of a signal carried by the control bus.

1 .....

2 .....

(2 marks)

(iii) Apart from data, what else is carried on the data bus?

.....

(1 mark)

5 The following code is part of a high level language program to manage a telephone contact list:

```
Const Max = 200

Type TMember = Record
                   Name: String
                   TelNo: String
                   Age: Integer
               EndRecord

Var Member : Array [1..Max] Of TMember

Procedure FindTelNo (WantedName: String)
Var EndOfList : Boolean
Begin
   EndOfList := False
   Ptr := 1
   While WantedName < > Member[Ptr].Name And Not EndOfList Do
      Ptr := Ptr + 1
      If Ptr > Max Then EndOfList := True
   EndWhile
   If EndOfList
      Then Print ('Name not in list')
      Else Print (Member[Ptr-1].Name, 'tel: ', Member[Ptr-1].TelNo)
   EndIf
End
```

(a) Identify the following by copying **one** relevant statement from the above code.

(i) constant definition:.....
(1 mark)

(ii) assignment statement: .....
(1 mark)

(iii) selection statement: .....
(1 mark)

(iv) iteration: .....

.....
(1 mark)

(b) Identify the following by copying **one** relevant part statement from the above code.

(i) user-defined type:.....
(1 mark)

(ii) parameter:.....
(1 mark)

(iii) local variable: .....
(1 mark)

QUESTION 5 CONTINUES ON THE NEXT PAGE

(c) Why is it considered to be good programming practice to use named constants such as **Max**?

.....

.....

(1 mark)

(d) (i) Why is it not good design to use a field **Age** when storing personal details?

.....

.....

(1 mark)

(ii) What could the programmer have done instead?

.....

.....

(1 mark)

(e) What values can a Boolean expression take?

.....

(1 mark)

11

6 In vector graphics the type, dimension and position of every graphic element making up an image are recorded, such as the start and end points, the thickness and colour of a line.

(a) How is a colour image represented in bit-mapped graphics?

.....

.....

.....

.....

(2 marks)

(b) Give **one** advantage of vector graphics over bit-mapped graphics.

.....

.....

(1 mark)

3

7 Traditionally, sound was recorded in analogue form, such as on vinyl records. For digital audio systems, the signals received from the microphone are sampled and the measurement of the amplitude can be stored as digital data. To reproduce the sound, the digital data is fed through a digital-to-analogue converter.

(a) Give **two** factors which affect the quality of sound.

1 .....

.....

2 .....

.....

(2 marks)

(b) What is possible when using the digital method of representing sound that could **not** be done with the sound recorded in analogue form?

.....

.....

(1 mark)

(c) What is sound synthesis?

.....

.....

(1 mark)

4

8 Members of the public can register with a video club after supplying their name and address and proof of identity. Every registered member is issued with a membership card. Each time a member borrows a video, data about the video and the borrower are collected, by scanning the barcodes on the video box and on the membership card.

(a) Sources of data can be *direct* and *indirect*. Complete the table below with the correct type of source.

		Direct / Indirect
(i)	The data collected above is used to record where a particular video is.	
(ii)	The data collected above is used to build up a profile of the members for targeted advertising.	

(2 marks)

QUESTION 8 CONTINUES ON THE NEXT PAGE

(b) What is the difference between data and information?

.....

.....

(2 marks)

4

9 There are a large number of programming languages. System software such as *compilers, assemblers, interpreters* are used to translate programs into machine instructions.

(a) Explain the different ways in which a compiler and an interpreter operate.

(i) a compiler.....

.....

(1 mark)

(ii) an interpreter .....

.....

(1 mark)

(b) If both a compiler and an interpreter are available for a particular programming language, under what circumstances would it be preferable to use:

(i) a compiler;.....

.....

(1 mark)

(ii) an interpreter? .....

.....

(1 mark)

(c) In what way does an assembler differ from a compiler?

.....

.....

(1 mark)

5

10 The algorithm below re-arranges numbers stored in a one-dimensional array called **List**. **Ptr** is an integer variable used as an index (subscript) which identifies elements within **List**. **Temp** is a variable, which is used as a temporary store for numbers from **List**.

```
Ptr ← 1
While Ptr < 10 Do
    If List [Ptr] > List [Ptr+1] Then
        Temp ← List [Ptr]
        List [Ptr] ← List [Ptr+1]
        List [Ptr+1] ← Temp
    Endif
    Ptr ← Ptr+1
Endwhile
.....
```

(a) Dry-run the algorithm by completing the table below.

It is only necessary to show those numbers which change at a particular step.

Ptr	Temp	List									
		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
		43	25	37	81	18	70	64	96	52	4

(7 marks)

(b) What will happen when **Ptr**=10?

.....

(1 mark)

(c) If the whole algorithm is now applied to this rearranged list, what will be the values of:

(i) List[1] .....

(ii) List[9] .....

(iii) List[10]? .....

(3 marks)

END OF QUESTIONS